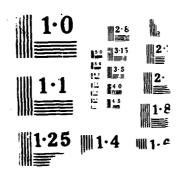
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All other editions are obsolete.

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## FINAL REPORT FOR AFOSR

## University Research Instrumentation Grant

The funds provided by the AFOSR in the amount of \$600,000.000 were used to purchase 2 Perkin Elmer 430P molecular beam epitaxy systems and a 13 feet long transfer tube. The growth reactors (both of them) are connected to the transfer tube which also houses the sample introduction chamber having a capacity of 6 x 3" wafers. In one end of the transfer tube there exist a "preparation" chamber provided for Prof. Morkoc by Perkin Elmer on a "loan" basis. This chamber is water cooled and is equiped with a high temperature stage so that Si substrates can be outgassed. Analysis equipment, such as the Auger electron spectroscopy and mass spectrum analyzer will have to be acquired later to make it useful. Si substrates and any other substrates can also be outgassed in the main body of the transfer tube itself, where a high temperature stage is also installed. This particular sample stage is also used as a working point for sample transfer from the transfer tube into the growth chamber. The other end of the transfer tube, facing the center of the rocm, is connected to a 4 way cross which also connects three other transfer tubes with associated MBE equipment and sample load locks.

The 430P MBE systems purchased with AFOSR funds contain 6 effusion cells, one being for As<sub>2</sub> source. RHEED, UTI mass spectrum analyzer up to 200 amu, 400 1/s ion pump and CTI 10" cryopump with the appropriate gate valves (VAT) for the cryopump well, ion pump well as well as for separating the growth chamber from the transfer tube, each. The transfer tube has two VAT valves, one on loan from Perkin Elmer, in either end. The gate valve (on a 10" flange) by the cross has been purchased using AFOSR funds. It should be mentioned that the transfer tube is pumped with a 300 1/s ion pump (assisted by a Titanium sublimator) and can be parted off with a VAT valve on 8" flange (6" valve).

The other transfer tubes have on them ceramics, metals. Si, one III-V machine converted to Si, and another III-V system converted to metals MBE. In addition, an ESCA with a semi spherical

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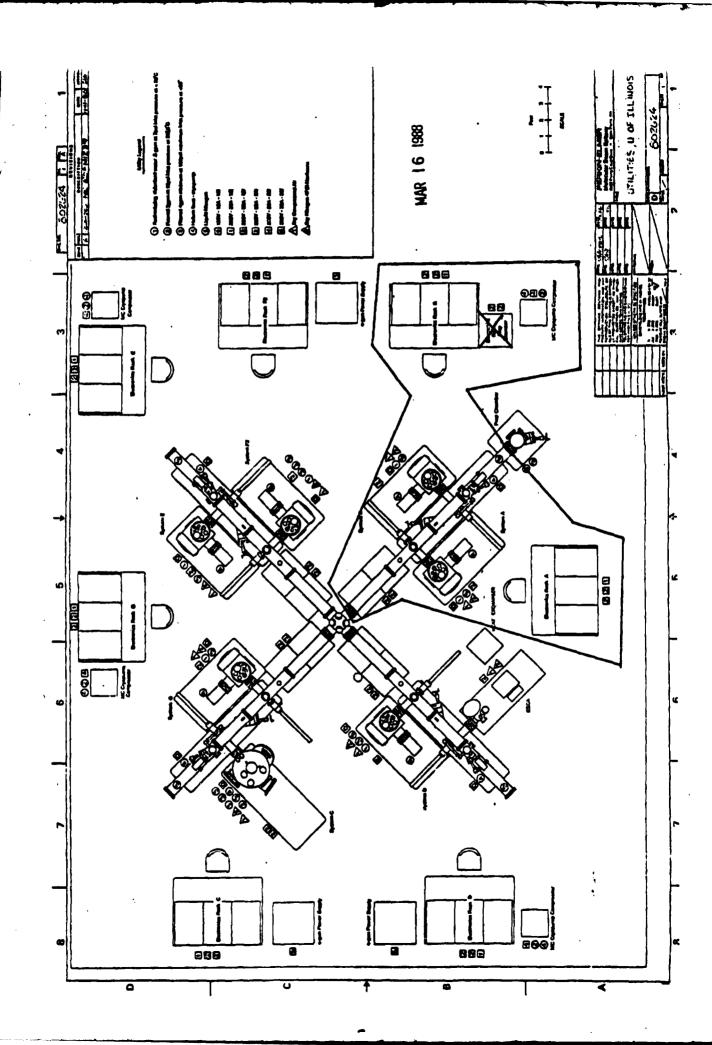
energy analyzer also exist on one of the transfer tubes, which can be accessed from the AFOSR transfer tube.

A Silicon MBE system was purchased for Morkoc by DOE through the materials research laboratory. The system is scheduled for delivery in July, 1988, and will be installed immediately thereafter.

The current status is that the room housing the 4 transfer tubes, and the growth reactors, locally named as the Epi center, is complete. The MBE systems (except the Si one) and the transfer tubes (including all the electronics) are in place and are undergoing preliminary vacuum tests on an individual basis. The plan is that once we are satisfied with the vacuum integrity, they will be connected to one another. Fig. 1 gives an schematic view of the overall system arrangement once completed. The tube pointing to the southwest and two 430P MBE systems connected to it are the ones purchased by AFOSR funds. System B. on the south side of the AFOSR transfer tubes was ordered with an additional cryopump so that gas sources for group V elements can be used by the alternate employment of two cryopumps. After careful consideration, we have decided to purchase a turbomolecular pump and a diffusion pump with approporiate cryopaneling for a state of the art gas source MBE. So far the turbomolecular pump (designed for gas source MBE environment by Balzar) and a diffusion pump have been ordered by funds obtained through DOE. Mass flow controllers and other gas manifold components are either on order or have already been received. The present plans call for the installation of a 10" Tee which will be used to install the turbo and diffusion pumps. A 10" flange valve belonging to Perkin Elmer will have to be used for the diffusion pump, which will have to be paid for at some point.

The details of what has been purchased for Systems A, B and the transfer tube is also enclosed here for the records of AFOSR. As the systems are installed Dr. G. Witt of AFOSR will be kept abreast of the developments and the final configuration.

We expect the installation of all systems to be completed by the end of June with epi growth to follow shortly afterwards.



ENG. DRAWING NO DETACHED PARTS LIST

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DRAWING NO.

802346

REFERENCE

CONTROL-ION PUMP, 120-500LS 60H MOUNT, WAFER, UNBONDED, 31NCH MOD 430 HASE SYSTEM 2.000 2.000 20.000 EM PART NO.

6/SYS, 12 SPARES SPARE

> KIT-200CC EFFUSN CELL(DC VRSN) OPTION, 60CC EFF CELL, GRAPHITE KIT, SINGLE SAMPLE ISOLATOR OPTION, 20CC EFFUSTON CELL TRANSFER TUBE ASSY, 13 FT. KIT, RGA SYSTEM W/DISPLAY OPTION, 2CC EFFUSION CELL CROSS, FLEXLINE CONNECTOR KIT, OPTION HEATER INSTL TRANSFER STATION OPTION MICRISTAR OPTION KIT, HEED SYSTEM EA EA ¥ EA EA EA **E** 2.000 4-000 000.1 2.000 2.000 1.000 1.000 2.000 1.000 2.000 2.000 05.801110. 19-800393 06' 802856 802858 08-802860 800528 800529 11-800531 802400 **30008** 802913 600592 800522 10 60 0 •

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COMPRESSOR-WATER COOLED,CT1-MC KIT, OPTICAL PYROMETER KIT, CAMERA OPTION .000

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